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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/966,221	09/28/2001	Thomas S. Laubner	17655	5888

7590 01/11/2008

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ART UNIT	PAPER NUMBER
2821	

MAIL DATE	DELIVERY MODE
01/11/2008	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/966,221
Filing Date: September 28, 2001
Appellant(s): LAUBNER ET AL.

Theodore Naccarella
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 7/26/2007 appealing from the Office action mailed 9/8/2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

It is noted that the US Pat. No. for the NICHOLS reference should be 5,831,577.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,157,348	OPENLANDER	12-2000

4,051,477	MURPHY et al.	9-1977
5,831,577	NICHOLS et al.	11-1998

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1,3-5,7,8,14,15,18 and 23-36 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Openlander (6157348) in view of Murphy et al. (4051477) as set forth in the Final rejection mailed 9/8/2005.

Specifically, regarding Claims 1,3-5,7,8,14,15,18 and 23-36, Openlander describes a microstrip antenna used in a mobile vehicle, in column 1, lines 18-29, where the antenna may be made from p.c. board materials and techniques with an upper patch/disk mounted above a ground plane with the p.c. board therebetween, and the lower ground plane is mounted to metal body of the vehicle. Two ground planes are employed here in such an arrangement. Figures 3 and 4 of Openlander show the patch 44 disposed over the ground plane 42 via dielectric posts. It would have been obvious to the skilled artisan to employ a p.c. board to support the patch and ground plane as taught by Openlander in column 1. The embodiment in Figures 3 and 4 is to be mounted upon a vehicle body which is the first conductive ground plane claimed. The second ground plane is that 42 which raises the patch 44. A feed means 56 is shown. Murphy et al are cited as teaching that it is known to decrease the radiation angle of a microstrip antenna by raising it above a second ground plane (see Figures 5-7 of Murphy et al). The lens 60 in Openlander lowers the radiation beam below 45 degrees as claimed. It would have been obvious to employ the techniques of Murphy et al in the

Openlander et al antenna, particularly since there are two ground planes employed therein. In other words, a skilled artisan would raise the antenna of Openlander to a predetermined height while maintaining enough pattern coverage in zenith, according to the realization in Murphy et al. Murphy et al. are merely cited to show that there is a trade-off between gain at zenith and at the horizon when attempting to raise the antenna above a ground plane. One skilled in the art would not raise the antenna in Murphy et al at position "c" as one would want to maintain some beam pattern in the zenith. A skilled artisan would have found it obvious that there is no decrease in gain at zenith when the lens is employed in Openlander because Murphy shows at least three distances in Fig. 5 in which the patch may be disposed above the ground plane (30 in Fig. 6). When the distance "b" is chosen, for example, there is no decrease in gain at the zenith unless the distance "c" is employed. Since Openlander uses the lens to provide improved gain below 45 degrees, one skilled in the art would not choose to raise the antenna to distance "c" according to Murphy et al. Distance "b" would be useful. Thus, a skilled artisan would lower the distance between ground planes, say for example from "c" to "b" as taught by Murphy in order to maintain a usable gain at the zenith. The same could be said by lowering the distance from "b" to "a" and then employing a lens to provide more pattern toward the horizon. Trade-offs occur when specific patterns are desired. A skilled artisan recognizes the techniques used by both patentees and utilizes them according to need. The lens 60-64 in Openlander is formed as a dome. Specific gain and angles in the pattern are obvious to vary to the skilled

artisan because they depend upon materials used for the lens and its thickness. Undue experimentation is not needed.

Claims 9-13 and 19-22 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Openlander in view of Murphy et al. as applied to claims 1,3-5,7,8,14,15,18 and 23-26 above, and further in view of Nichols et al. (5831577) as set forth in the Final rejection mailed 9/8/2005.

Specifically regarding Claims 9-13 and 19-22, adding a monopole to a microstrip antenna is shown to be obvious by Nichols et al in Fig. 3, where a dielectric 68 is disposed around the monopole 66. It would have been obvious to add a monopole to the Openlander/Murphy et al antenna in order to provide an additional frequency band in the system, as suggested by Nichols et al.

(10) Response to Argument

Several issues have been raised in the Brief and they will be addressed in the order that they appear as follows.

The arguments begin on page 6 of the Brief and Appellant sets forth the position of the combination of the three patent references in the first two paragraphs thereof.

Appellant argues in paragraph labeled "A" on page 6 of the Brief that the combination of references is improper because there is no suggestion or reason to combine the teachings of Openlander and Murphy and that the prior art teaches away from the combination of references set forth in the rejections, and finally improper hindsight was employed. These arguments are presented more specifically in paragraph sections 1 through 3 spanning pages 6-15 of the Brief.

In the paragraph labeled "1", bridging pages 6 and 7 of the Brief, MPEP section 2143 is presented. Appellant states that there is no suggestion to combine or an expectation of success. However, it is clear from the references to Openlander and Murphy that there are reasons to combine and expectations of success. Each reference presents advantages of their techniques for improving antenna performance. All techniques must be considered and kept in mind when designing antennas for shaping the beam pattern. Although appellant states in the second paragraph on page 7 of the Brief, that the "goal of Openlander is to increase low angle radiation without increasing the height of the antenna", it is certainly not a requirement that the height be restricted to a specific dimension, either linearly in zenith or along the plane of the patch structure, such as in terms of wavelength. Appellant should realize that many mobile environments exist and in any vehicle where there are obstructions, such as differing roof heights, the height of the cab structure in trucks, spoilers in cars, and other obstructions, etc., have an effect on antenna performance. An antenna with a substantial height dimension is welcomed in environments that obstruct any view of the satellite in the sky. A skilled artisan knows that obstructions deteriorate the signal strength and tries to avoid any obstructions. The claims at hand are not even presented in a mobile environment. They merely recite a package of well known microstrip elements and antenna structures. In the middle of page 7 of the Brief, Appellant cites what is believed to be the most relevant portion in Openlander, which basically describes the lens structure for lowering or redirecting the radiation pattern within a range of angles. Openlander acknowledged in col. 2, first paragraph, such a well known

concept in the patent to Bartlett et al., US Pat. No. 3,414,903, which uses a dielectric structure between the antenna (horn) radiator and a lens, used for focusing. That dielectric structure tends to guide the energy toward the lens, where it adjusts the radiation pattern rather than focus it. Openlander also acknowledges that patch antennas normally have a high radiation angle toward the zenith, as is well known.

Appellant describes Murphy in the last full paragraph on page 7 of the Brief in connection with Fig. 6 thereof which shows the patch antenna radiator 38 disposed above a ground plane 32 and another ground plane 30. The patch 38, dielectric substrate 36 and ground plane 32 define what is commonly called a microstrip antenna and has a relatively narrow bandwidth property due to its small height dimension and is recognized by Openlander (col. 1, lines 26-40).

In the paragraph bridging pages 7 and 8 of the Brief, Appellant states that there is no reasonable combination of the two references, Openlander and Murphy, because the former teaches a prism for lowering the radiation angle pattern and the latter employs the microstrip antenna and its ground plane spaced apart from a lower ground plane. However, there is strong disagreement with such an argument. Upon first reading of Appellant's Claim 1 for example, it would appear that the last two sub-paragraphs, describing the specific structures of the claimed antenna components, are somewhat redundant because the lens and raising the patch above a second ground plane would appear to produce the same result (i.e., an angle less than 45 degrees). But, what Appellant does not claim is the extent of the lowering of the radiation pattern attributed by each element, namely the lens and raising the patch above a second ground plane.

Murphy was precisely cited in the combination rejection to address specific angle ranges of the desired radiation pattern. Appellant chose to leave open the lower angle of radiation as applicant believes to be the inventor of such an angle with the components claimed. However, Appellant has omitted a very important teaching of Murphy in describing the teaching (last full paragraph on page 7 of the Brief). In the patent to Murphy, the very well known "image radiator" concept is discussed, widely recognized by the antenna artisan, builder and engineer. The resultant radiation patterns are affected by the height of the antenna above ground. Figures 1-3 of Murphy sets forth the concept. Figure 5 of Murphy shows the lowering of the "radiation gain" or pattern as the height of the radiator is increased above the ground plane. Appellant ignores that Murphy's design is recognized as providing a radiation pattern at relatively "low radiation angles ***near*** the ground pane surface" (emphasis added). This teaching or suggestion to the skilled artisan is found at least in col. 2, lines 28-35, col. 3, lines 30-37 and the first full paragraph in col. 4. The latter citation specifically suggests that the height be about a quarter of a wavelength above the lower ground plane in order "to obtain a substantial increase in the proportion of radiated energy appearing at low radiation angles ***along*** the ground plane" (emphasis added). Appellant chose to claim the invention having no lower limit, or as an "open-ended claim", i.e., the radiation gain less than 45 degrees. Thus, Murphy was cited because Openlander only provided a prism to direct the beam to 20 degrees or so. Further lowering is done by following Murphy's teaching or suggestion to the skilled artisan, by providing a lower ground plane and increasing the height of the microstrip patch structure above the lower ground

plane. [This same principle, explaining it as a "mirror image", was known in the 1930's when quarter wavelength monopole radiators were used to provide a good ground wave pattern in the AM Broadcast Band, primarily used by lower power local stations. The half wavelength radiators were used to provide sky wave radiation for high power, clear channel stations at night]. Since Openlander teaches that the prism limits the radiation angles to 20 degrees to approximately 70 degrees, Murphy provides the skilled artisan with the well known technique of increased height "to effectively... increase the proportion of radiated energy occurring at lower radiation angles close to the ground plane surface itself" (Murphy, col. 3, lines 33-37). It is apparent that Openlander recognizes that increasing the height would lower the radiation pattern. However, he emphasizes the use of the prism "without increasing the overall height or prominence of the low-profile antenna 100" (Openlander, col. 6, lines 36-42). It is also clear that Openlander uses the dielectric prism to adjust the radiation pattern of the antenna, as did Bartlett (Openlander, col. 2, first paragraph).

In the first full paragraph on page 8 of the Brief, Openlander and Murphy do not merely or simply disclose two different ways to increase low angle radiation as argued by Appellant. The benefit is wholly gained as set forth in the above combination of Openlander and Murphy, particularly because Appellant claims two different ways to increase low angle radiation. The combination specifically addresses such broad concepts because Murphy increases the radiation along the lower ground plane and Openlander uses the dielectric prism to adjust the pattern to his range of angles desired.

Further, in response to the Appellant's allegations in the first paragraph on page 8 of the Brief, Openlander and Murphy do not simply teach two different ways to achieve a similar result because there is a basis to conclude that the combination of the two leads to the desirable angle of radiation pattern between the lower ground plane and about 70 degrees therefrom. Thus, the desirable result or synergy allows for signals to be received in that continuous range of angles. The argument in the second paragraph on page 8 of the Brief is not analogous to a first reference teaching as proposed. The combination, as presented, complements the antenna beam by providing a wide coverage well below zenith. It is the open end for the lower angle of Appellant's claims that allows such a combination and thus the skilled artisan finds obvious the specific directive to provide a resultant beam with a better coverage than either alone.

In the paragraph bridging pages 8 and 9 of the Brief, although Appellant argues that the invention uses the combination of lens and raising the height of the antenna above the lower ground plane, by increasing the effectiveness of the lens and ease of manufacture, such characteristics are not at issue in the claim limitations. Also, the "optical properties" argued here are recognized by Openlander because the prism is used in the same fashion as Bartlett, i.e., for adjusting the radiation pattern of the antenna. This is the same reason Appellant uses the lens, which is widely recognized and taught by Openlander. The manufacture of the assembly is not an issue. The combination of references presented here provides a specific technical objective in employing the lens/prism and height increase above the ground plane. Both techniques provide specific beam pattern control and result. Those techniques are complements of

each other because the raising of the ground plane height lowers the radiation pattern to the lower ground plane. Such a result provides more efficient antenna coverage. That is the motivation of the skilled artisan in the combination presented.

In the first full paragraph on page 9 of the Brief, the radiation "out of the patch" is argued here, but such a characteristic is not an issue because there is nothing of the sort claimed. Claim 1, for example, attributes the dielectric lens and the second ground plane for raising the patch, "to increase radiation gain at an angle less than 45 degrees." Openlander does the same with his dielectric prism/lens and Murphy further lowers radiation "close to the ground plane itself", or "along the ground plane", as preferred. The expectation of success with such a combination is a continuous pattern from along the lower ground plane up to 70 degrees, and not straight in to the zenith. Neither reference wants their patch radiators to direct most of the radiation pattern toward the zenith.

In section "2" on pages 9-12 of the Brief, Appellant argues that the combination defeats the two principles of operation of Openlander. However, as set forth, the two concept teachings in the references are complements. One does not destroy the other. The techniques used add to the efficiency of the radiation pattern. A destruction of the efficiency would be to radiate the energy toward the zenith, rather than low angles, where the desirable communication exists (e.g., satellite communication, both geostationary and geosynchronous). Appellant argues that increasing the height in Openlander would defeat his desire to keep the structure a low profile antenna (page 10 of the Brief). As pointed out, Openlander recognizes that increasing the patch height

would lower the beam pattern, and thus uses a lens/prism to provide a range. That range does not include communicating with stations near the horizon (i.e., along the ground plane), such as in satellites that orbit to the horizon and below. Appellant argues the term "low profile antenna." Such a term is undefined, in the patents and in the present claims. Murphy's antenna is low profile. It is a microstrip antenna used in a mobile environment as is Openlander. No height dimensions either linearly or in terms of wavelength are claimed or discussed. An increase in height still may maintain a "low profile", depending upon the mobile environment. There is no requirement in Openlander to maintain a specific height. But, the skilled artisan knows that increasing the height lowers the beam pattern along the ground plane. Appellant's open-ended lower angle is precisely the reason Murphy is applicable to and a complement to the Openlander antenna. Alternatively, Murphy's antenna may employ the Openlander lens/prism for providing a pattern in a range of 20 to 70 degrees at the same time filling in the lowest angle along the ground plane. Regarding the argument in the third paragraph on page 10 of the Brief, the two main principles of Openlander are not defeated employing the technique of Murphy because merely raising the ground plane height also may define a low profile. It is strictly in the hands of the skilled artisan to employ the ultimate height of the antenna, without defeating the objectives of Openlander. A skilled artisan would quickly recognize that the Openlander antenna does not by itself provide radiation along the ground plane for lower communication satellites, for example. That skilled artisan would be led to the Murphy technique, increase the ground plane spacing while maintaining a low profile. Openlander does not

ultimately aim to provide the "lowest profile antenna" because he clearly uses a foam 66 beneath the antenna structure. Since low profile is certainly a relative term, the microstrip antennas of both references are deemed to be low profile and any increase in height does not destroy any objectives of either reference particularly since it is the beam pattern which is ultimately the most important factor in the antenna design, particularly in satellites since it is FCC-mandated and is essential for continuous communication with satellites near the horizon. The paragraph bridging pages 10 and 11 of the Brief sets forth the operation of the Murphy antenna. The first full paragraph on page 11 of the Brief argues the difference in heights between the two references and what is regarded low profile. It should be recognized that Murphy's quarter wavelength spacing is low profile compared to a doubling of that distance to a half wavelength. No wavelength dimension is given in any of Appellant's claims. Murphy is used to address the obviousness of providing a beam pattern down to and along the ground plane, a condition which Appellant obviously intended to claim because the claims have only an upper limit of 45 degrees. That limit is provided in the range of Openlander. The principles of operation are not changed by the combination, but are complements in order to provide a more efficient radiation pattern recognized by the skilled artisan. It is only Openlander that limits his invention beam pattern down to 20 degrees. That does not preclude the skilled artisan from finding it obvious to increase ground plane height to increase beam pattern efficiency by allowing the lowest angle of communication (e.g., satellites near the horizon) along the lower ground plane. Openlander's antenna would not be destroyed by increasing the ground plane height because the technical reasons

for doing so, provided by Murphy, are more important than the undefined "low profile" objective of Openlander. It is essential to maintain communication rather than a loss of signal. Maintaining a signal in a communication link is more important than increasing the ground plane height, particularly since mobile (e.g., vehicles) environments vary greatly.

Appellant discusses the allowed claims, 6 and 17 in the paragraph bridging pages 11 and 12 and discusses the slanted sides are for ease of manufacture. However, that limitation is not taught in the art (thus, the claims were allowed) and the ease of manufacture is not an issue in the elements recited in the claims.

In the first full paragraph on page 12 of the Brief, it is argued that the combination of the references defeats the goal of both, providing a low angle radiation. However, as pointed out above, the two techniques complement each other and do not destroy the pattern results. The pattern is predictable because in Murphy the pattern is lowered to extend along the lower ground plane and in Openlander the lens/prism is employed to adjust the radiation pattern of the antenna, as needed; a well known concept.

In section "3" beginning on page 12 of the Brief, Appellant alleges improper hindsight, and up to page 14, reproduces the arguments and position in the combination rejections of record. In the first paragraph on page 14 of the Brief, again, Appellant misses the important aspect in Murphy and does not acknowledge it. Appellant argues that "Murphy teaches nothing more than that increasing the spacing between the two ground planes decreases radiation at zenith (while radiation at low angles increase) and vice versa." That quote makes it appear that Murphy and Openlander teach

"overlapping radiation patterns" by over-simplifying and ignoring Murphy's preferred radiation pattern. Murphy does not merely teach low angle radiation. More specifically, Murphy suggests that the radiation is desired near, along and close to the lower ground plane. The specific locations in Murphy for this desirability of radiation pattern are cited above. In the second paragraph on page 14 of the Brief, Appellant argues that the Murphy patent teaches two concepts. That is true from Figures 1-3 and 5 of Murphy. Since Murphy teaches the technical aspects of raising and lowering the height dimension to the lower ground plane, it is strictly in the hands of the skilled artisan what pattern is desirable in a particular application/environment. Appellant does not specify any environment in the claims, e.g., satellite communication. The skilled artisan recognizes the obviousness of the effect of changing the ground plane height from the teaching of Murphy. A skilled artisan is free to design a particular pattern by changing the ground plane height. Changing it in either position does not destroy the teaching of Murphy. Objectives may be changed depending upon the antenna application. Appellant recites no particular objective except that the beam pattern is below 45 degrees due to two specific structures, e.g., lens and raising ground plane height. Both of these techniques are recognized as obvious by the skilled artisan in view of the teachings of both Openlander and Murphy. Neither technique destroys the operation of the resultant antenna. The combination of teachings of these two references are purely complements of each other because the radiation patterns do not overlap, they fill-in from 70 degrees down to 20 degrees and below along the ground plane.

In the paragraph bridging pages 14 and 15, Appellant again reiterates that the references "just teach two different ways of achieving a similar result with no suggestion that the combination thereof would provide any synergistic result toward achieving that goal." Openlander provides no teaching for defining the radiation pattern along the lower ground plane. Only a range is defined by the lens/prism because it merely adjusts the pattern as recognized by the Bartlett patent cited therein. Although, the patents do have similar objectives of lowering the radiation angle of the beam pattern. The specifics of the pattern angle are obvious to the skilled artisan. Since Appellant merely recites two techniques responsible for an angle of less than 45 degrees, such a "range" is suggested by these references. The pattern being filled-in provides a complement of techniques employed in microstrip antenna arrangements. These techniques are fully combinable because they do not produce identical results, but complement the beam pattern in the "range" claimed. The skilled artisan thus recognizes as obvious to employ both techniques in order to produce a continuous radiation pattern. Neither technique would provide the outcome suggested by Appellant in the second sentence on page 15 of the Brief because the lens/prism adjusts the pattern within the desired angle range, i.e., 20 to 70 degrees, but not down to the ground plane as does Murphy. Thus, the techniques are fully combinable in order to provide the synergistic result, both avoiding the maximum beam at the zenith.

In section "B" "1." on page 15, although Appellant argues the two satellite services and their satellite positions and a beam at zenith (or some usable gain thereat), such arguments are not commensurate with the scope of the claims because there are

no limitations to that extent claimed. Although Appellant cites the "goal" in the paragraph bridging pages 15 and 16, of a usable beam at zenith, the claim language is a relative term. Some energy is at zenith in the references, but the specific measurement, whether it is usable at long distances is not relevant. For short distances, there is a usable zenith pattern.

Appellant argues the dependent claims in section "2" beginning on page 16 and ending on page 18. The specific gain values would not require any undue experimentation with lens material, the use of parasitic elements or reflectors, amplifiers, etc, all of which provide additional gain to an antenna. The specific values are important but can be achieved using ancillary devices or circuits. In the first paragraph on page 17 of the Brief, the specifics of the satellite arrangement is not a factor in the limitations because they also depend upon frequency of operation, weather conditions, and the ancillary devices used to maintain a usable signal in the communication link. Merely citing a gain value at a particular angle is nebulous because at different frequencies and different applications/environments, the gain changes.

In section "II" bridging pages 17 and 18 of the Brief, Nichols was cited, as recognized for the addition of a monopole combined with a patch antenna, and shown to be obvious to combine with the primary references of record, or any patch antenna allowing a center hole to exist.

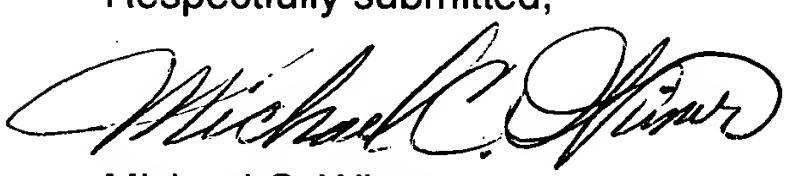
Since evidence of obviousness has been set forth and the level of ordinary skill in the antenna art resolved in the record it is not seen that the claims patentably distinguish over the prior art.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



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